Proposal for the
North Dakota Statewide Road Centerline Project

North Dakota 9-1-1 Association GIS Committee

May 2008

I. GOAL

Enhance the ability of all state agencies as well as local and tribal governments to build, use, and disseminate spatially accurate and complete road centerline data for decision making and managing resources.

Attaining this goal will result in a level of interoperability that will serve all geographic information systems and applications used throughout the state.

Objective 1 Obtain a statewide seamless, spatially accurate, and complete road centerline dataset for all federal, state, county, and improved roads that is accessible by all state agencies, local and tribal governments, and the general public.

Objective 2 Improve the interoperability and redundancy of dispatch centers by integrating the statewide road centerline dataset into all dispatching systems including mapping software, computer aided dispatch and future automated vehicle location technology.

Objective 3 Improve governments' and the public's ability to access and use spatially accurate data resulting in additional information sharing and leveraging future technical investments.

II. BENEFITS

1. Emergency Services & Public Safety

    - Fastest and safest route to the scene
    - Responders working within their jurisdiction or in support of others
    - Foundation for all response and public safety organization who document critical safety information

The success of any response is initially dependent upon responders being able to get to the scene in the fastest safest method and route possible. Whether the responders are responding out of their normal jurisdiction in support of others or is in need of exact locations of potential dangerous infrastructures, accurate map information is essential. This base map will serve as the foundation for all response and public safety organizations to document (attribute) critical safety information. When the time comes, responders will know where the shutoffs valves, electrical lines, pipelines, hydrants, and any other asset is within 3 feet.

2. General Public

- Use of commercialized GIS products such as car navigation systems and Google Earth
- Tourism, hunting, fishing
- Enhanced public safety

The general public will have direct benefit from accurate GIS information. Citizens, and those that pass through our state, can utilize commercialized GIS products such as car navigation systems, and open source maps through Google Earth and MapQuest (and others) through internet venues. Private industry can utilize query and statistical analysis processes for various purposes (such as identifying consumer trends and population hubs) with the unique visualization and geographic analysis benefits offered by maps.

3. State Government

- Sales tax collection
- Base map for nearly all mapping activities
- Human and animal disease control and tracking
- Mapping of sex offenders

State agencies are more frequently utilizing systems that depend upon spatially accurate and complete road data for use in determining location. Determining the correct sales tax to be collected by a vendor for a given city or county will be assisted greatly with a road data set containing the necessary attributes. Accurate plotting and tracking of human and animal disease outbreaks or the location of registered sex offenders will be significantly enhanced with the updated road data set.

4. Local Government

- Sales and land valuation tax collection
- Multi-county response to emergencies and other public safety
- Management of land use, facilities, infrastructure

In addition to public safety, the project will aid local governments in the accurate management of land use, facilities, and infrastructure asset control (GASB). The recent focus on GIS tax parcel development will benefit from this project by creating an accurate framework from which to work. Local efforts to employ automated vehicle location (AVL) technology beyond enhancing public safety can also be facilitated with this project.

5. Private Industry

- Economic development
- Mapping of oil & gas fields
- Siting for pipeline, electric transmission, and wind power
- Implementation of public safety systems

The private industry has been making huge strides in GIS mapping for oil and gas fields and pipelines, coal fields, electric transmission and local lines, communication infrastructure, wind power, water use mapping and many others. Providing accurate State and County map and data information will impact planning, transportation, safety and implementation in government and private industry and will be a part of the "Addresses For The Nation" concept.

III. HISTORY

In November 2003 the GIS sub-committee of the North Dakota 9-1-1 Association Wireless Committee submitted a survey to North Dakota counties for the purpose of determining individual levels of GIS/GPS use and the status of road centerline mapping in North Dakota. Information from the survey was used to support a plan put forth by the Division of Emergency Management (DEM - precursor to Department of Emergency Services) to create a statewide seamless dataset. From the outset, DEM believed the data would be publicly available, developed at three meter accuracy, and funded largely by Homeland Security funds.

In December 2003, at the request of the Governor's chief of staff, directors of agencies comprising the GIS Technical Committee (GISTC) and a representative of DEM met in the Governor's office to verify interest in creating a statewide dataset. The outcome was positive and resulted in development of a draft road centerline request for proposal (RFP) requiring horizontal and vertical accuracy of +/- .5 meters.

The road centerline RFP was released March 30, 2004. On July 7, the notice of intent to award was sent to the finalists. However, due to last minute disagreements among stakeholders, the notice of intent was revoked.

In November 2006, GISTC signed a contract with GeoComm to conduct a study determining the most feasible and cost-effective approach and an estimate of cost to meet the goal of developing and maintaining a statewide road centerline dataset using the best available information.

The study resulted in a series of draft road centerline standards and based upon new survey findings, provided two options for developing a statewide road centerline dataset. The recommended option was an investment of just over an estimated $1.8 million which integrated existing data congruent with suggested standards but called for new data collection to replace that which was did not meet the draft standards.

IV. CURRENT SITUATION

On January 29, 2008, the ND 9-1-1 Association GIS Committee (formerly a sub-committee of the Wireless Committee) participated in a conference call to re-cap past goals and discussions, review GeoComm recommendations, discuss standards, review objectives, identify potential partners, and discuss funding mechanisms. The ND 9-1-1 GIS Committee will serve as the road centerline steering committee. As a result of that meeting, a proposal was developed that will be reviewed within the GIS Committee then circulated through larger 9-1-1 Association and other state and local organizations. It is important that all PSAP's and State Radio work together towards a common goal.

On March 13, 2008 the ND 9-1-1 Association GIS Committee met to review the draft proposal and identify next steps. As part of that

meeting, the Committee decided that the April 2007 GeoComm estimate should be validated by verifying the reported attribute and spatial accuracy and reported miles. This validation would also include cost increases due to higher fuel prices.

V. SOLUTION

Standards

Road centerlines collected and maintained will follow the North Dakota Road Centerline Standard proposed in the 2007 study, pending final approval of the standard. The draft standard is available at http://www.nd.gov/gis/news/20061117.html at the bottom of the Milestones section. The review and modification of the draft standard will be done by the 9-1-1 Association, the GIS Technical Committee (GISTC), and other stakeholders including invitees from the private sector. Approval of the standard will come from GISTC.

All vendors wishing to create and/or maintain road centerline data will be required to follow the North Dakota Road Centerline Standard. This is done to ensure that a seamless dataset can be created and maintained.

As described in the standard, there will be a base set of attributes applicable to all local centerline data, though local jurisdictions will have the flexibility to add additional attributes as required.

The desired horizontal spatial accuracy for all visually verifiable improved roads will be one meter or better 95% of the time. This exceeds the National Emergency Number Association (NENA) published 2007 standard of 10 feet or less due to the multiple uses envisioned for the North Dakota dataset and the need to help ensure its usefulness well into the future.

Though the GIS Committee recognizes the one meter or better accuracy level may create a number of issues such as mis-match with less accurate data and may drive the need for some local government to acquire more GPS equipment capable of higher accuracy, one meter or better data will provide functionality of this data well into the future with a much less potential of having to re-develop this data. If an entity desires to have greater accuracy, the additional cost of creating and maintaining that data will be borne by that entity.

Data Development

All existing data from local jurisdictions which meet or exceed the approved standard, and are available from the owner of that data, will be used in the development of the statewide dataset. Data which do not meet the spatial accuracy and/or the attribute requirements will be improved.

Centerlines and their attributes will be collected. Additional data such as address points may be collected. Address ranges will be theoretical with local jurisdictions having the option to use actual values.

A third-party vendor will be selected by the state from the GIS Professional Services Contract Pool. The vendor will serve as a general contractor in the development, maintenance, and funding of this road centerline project.

Where data is to be collected and/or maintained, local jurisdictions will have the option to select their vendor of choice. If this is to be done, an RFP template will be developed for use by local jurisdictions, as was done for the Agriculture Land Valuation Procedure developed by the North Dakota Association of Counties. This template will also include accuracy validation testing processes.

If a local jurisdiction does not have the necessary resources to hire and manage a vendor for road centerline collection, then the third-party vendor will coordinate with the local jurisdiction.

Where required, data sharing agreements will be established between the state and local government partners. This is to ensure that the data, which will be publicly available, is free of proprietary information.

Data Maintenance

Road centerlines will be maintained by the local jurisdictions, as is currently done, using their own resources or their vendor of choice.

Entities lacking sufficient resources to maintain road centerline data will be identified. Those jurisdictions will be maintained as part of this project for two years, then by the local jurisdiction. During those two years, a permanent mechanism for maintaining the data will be identified.

Using a schedule based on the average update frequency of their centerline data, local data providers will upload their data into the state's GIS Hub. This upload will utilize a web-based tool provided by the state. Processes on the GIS Hub will then be run to merge the multiple datasets into a single, seamless dataset that will be available to state agencies, local government, and the public.

Compilation of datasets from counties and cities into a seamless layer can be dealt with in a number of ways. In one method, no matter the number of changes within a given dataset such as that of a county, that entire dataset replaces the previous dataset. In another method, change detection processes are used to update only what is needed. Edge matching processes along common boundaries will need to be implemented. Edge matching can also be done in a number of ways, such as using common and previously agreed upon boundary points used by each jurisdiction.

Public Safety Answering Points (PSAPs) will require frequent updates of road centerline data to ensure their dispatch systems have up-to-date data. This frequency of update will have to be determined and then will be balanced with the dispatch centers' requirements, the frequency of updates within the jurisdictions of the data providers, and the methodology and resulting burden placed on the data providers to upload their data. Automated processes may be possible.

Funding

Road centerline data will be developed using one-time funds provided by the State Legislature during the Legislative Session which will begin January 2009. Prior to the Session, an estimate of cost needs to be developed and submitted to the Office of Management and Budget, no later than July 15, 2008. These one-time funds would include:

1. Road centerline and perhaps point address data development.
2. Two years of pre-paid data maintenance costs to provide sufficient time to develop a self-funding mechanism.
3. Provide GPS equipment for local jurisdictions already maintaining their centerlines but with equipment not capable of meeting the spatial accuracy standard.
4. Project management and oversight by an independent third-party vendor. Successful completion of this project necessitates the need for a Project Manager.

The Information Technology Department or other sponsoring agency will provide payment to the vendors who are collecting and/or upgrading the road centerlines for local jurisdictions through the third party vendor. When they are able to do so, the local jurisdictions will be responsible for selecting and managing their vendor of choice. When they are not, the third-party vendor will do so on their behalf. A set amount for each jurisdiction would have to be pre-determined to ensure that funding targets are in place for each.

Prior to and during the Legislative Session and as needed, letters of support and testimonies from state and local agencies will be provided to ensure a successful passage of the bill.

The 9-1-1 GIS Committee believes that the time is right to move forward to develop a statewide road centerline dataset and in doing so, will give the citizens of the state an essential tool for assisting in public safety as well as serving the needs of local and state agencies.